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Incidence of the Parasitic Isopod, *Olencira praegustator*,
in Juvenile Atlantic Menhaden

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INCIDENCE OF THE PARASITIC ISOPOD, *OLENCIRA PRAEGUSTATOR*, IN JUVENILE ATLANTIC MENHADEN.—Infestation frequency of the parasitic isopod, *Olencira praegustator* (Latrobe), in juvenile Atlantic menhaden, *Brevoortia tyrannus* (Latrobe) was estimated in collections from 19 estuaries along the Atlantic Coast (Fig. 1) while conducting tagging studies in September 1970. Extensiveness of parasite damage, developmental stage of the parasites and number of parasites lost from the fish were also investigated. This is the first report on the infestation of juvenile menhaden by *O. praegustator* since reported by Smith (1892).

Infestation frequencies ranged from 0% to 46% in juveniles from the 19 estuaries (Table 1). Isopods were present in every sample of juvenile menhaden from the 14 estuaries south of Long Island, New York except for the collections from Chowan River, North Carolina. Five samples collected on or north of Long Island, however, did not contain any isopods. Westman and Nigrelli (1955) did not include *O. praegustator* in their list of parasites infesting menhaden in the New York region and Ellison (1951) suggested *O. praegustator* is only abundant in the menhaden's southern range. Our observations suggests that it may not occur in the menhaden's northerly range.

Two instances where schools of menhaden in the same estuaries had different infestation frequencies were observed. In Nansemond River, Virginia, samples of fish from two schools were both about 50% infested, whereas samples of fish from a third school

were not infested. The infested schools were captured further upstream than the uninfested school and the fish were in poorer condition; many fish had been hemorrhaging from the eyes, fins and snouts and had opaque lenses and body scars. Fish in the uninfested school appeared healthy. At Onancock Creek, Virginia, however, samples from two schools of juveniles in good condition and captured in the same area but on different days had infestation rates of 0% and 50%. The differences in rates of infestation between schools were statistically significant.

Few details of the life history of the parasite and host-prey relationships are known. Dahlberg (1969) described *O. praegustator* as a sexually dimorphic protandrous hermaphrodite and the young, which are incubated in a brood pouch, resemble mature males. The isopod has been reported only from menhaden, genus *Brevoortia*. In a laboratory experiment using adult menhaden infested with *O. praegustator*, free-swimming recently hatched isopods left the host's mouth and attached to other menhaden. Some of these

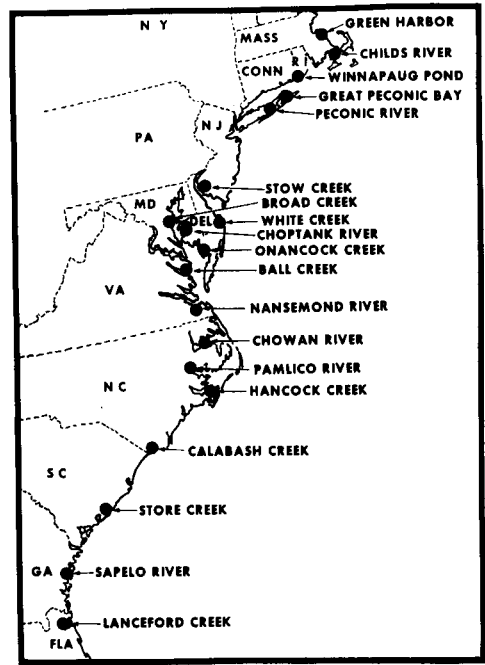


Fig. 1. Estuarine areas from which juvenile menhaden were collected.

TABLE 1. INFESTATION FREQUENCY AND ESTIMATED DAMAGE BY DIFFERENT DEVELOPMENTAL STAGES OF *O. praegustator* IN JUVENILE ATLANTIC MENHADEN COLLECTED FROM 19 ESTUARINE AREAS.

Location	Number of Fish Examined	Mean Fork Length of Fish (mm)	Number of Fish Parasitized	Percent of Fish Parasitized	Damage to the Gills				Stage of Development		
					Massive	Major	Minor	None	Mature Female	Transitional	Parasite Absent
Green Harbor, Mass.	47	74	0	0	—	—	—	—	—	—	—
Childs River, Mass.	37	73	0	0	—	—	—	—	—	—	—
Winnapaug Pond, R.I.	114	87	0	0	—	—	—	—	—	—	—
Great Peconic Bay, N.Y.	50	120	0	0	—	—	—	—	—	—	—
Peconic River, N.Y.	29	65	0	0	—	—	—	—	—	—	—
Stow Creek, N.J.	10	134	3	30	2	1	0	0	0	0	3
White Creek, Del.	23	133	1	4	0	1	0	0	1	0	0
Choptank River, Md.	16	136	4	25	0	2	2	0	4	0	0
Broad Creek, Md.	22	130	9	41	1	4	4	0	5	2	2
Onancock Creek, Va.	75	153	32	43	8	17	7	0	9	4	19
Ball Creek, Va.	40	126	3	8	0	0	3	0	3	0	0
Nansemond River, Va.	155	121	71	46	Not Determined						26
Chowan River, N.C.	68	82	0	0	—	—	—	—	—	—	—
Pamlico River, N.C.	76	72	2	3	0	1	1	0	2	0	0
Hancock Creek, N.C.	25	77	2	8	0	0	2	0	1	0	1
Calabash Creek, N.C.	60	86	2	3	0	1	1	0	2	0	0
Store Creek, S.C.	52	131	4	8	0	0	3	1	4	0	0
Sapelo River, Ga.	51	126	4	8	0	1	2	1	3	0	1
Lanceford Creek, Fla.	71	72	1	1	0	0	1	0	1	0	0



Fig. 2. Transitional stage of *O. praegustator* (19 mm total length) on an Atlantic menhaden (149 mm fork length). Note: A mature female and a small male *O. praegustator* were illustrated by Turner and Roe (1967).

isopods entered the mouth cavity of the host, while others attached externally for 3 weeks, the duration of the experiment, or left the fish and infested other menhaden. Male *O. praegustator* while in the free-swimming stage, evidently mate with females and then after finding and attaching to a non-infested host, the males begin transforming into females. During this transitional stage the parasite is facing posteriorly in the host, and is attached to the gills. It causes considerable damage to gill filaments, arches, rakers and opercles. After the transition is complete, the parasite faces anteriorly in the buccal cavity and assumes an apparent commensal relationship with the menhaden.

Isopods of different developmental stages were separated into two groups according to their positions in the fish (Table 1). The largest isopods, all of which faced anteriorly and were attached to the roof of the mouth, were called mature females after Dahlberg (1969). Those facing posteriorly and attached to the gills were all longer than 15 mm and were called transitionals (Fig. 2). We did not find any small males or young in the fish as found by Turner and Roe (1967) and by Dahlberg (1969).

Developmental stages of the isopods collected suggested that juvenile menhaden were infested early in life and during a short

period of time. In Store Creek, South Carolina and Sapelo River, Georgia, fully grown gravid isopods were found in menhaden about 8 months old, indicating that infestation had taken place at an early age. Since isopods of about the same size occurred in all juveniles within an estuary, we assumed that the fish were infested during a short time span. If juveniles in an estuary had been infested over a long period of time, isopods ranging from young to mature females would have been present in the fish as found by Dahlberg (1969) in Florida estuaries where adult menhaden occurred throughout the year.

Dahlberg (1969) reported that isopods rarely dislodged when collected, but present observations indicate they detached frequently when the menhaden were caught and handled. About one-third of the parasites in the fish sampled from the Nansemond River, Virginia dislodged after the fish had died and were kept in a container of water about 1 hour. Loose isopods were also found in several sacks that were used to store fish samples from other areas. Fish in samples from Onancock Creek, Virginia and Stow Creek, New Jersey lost many isopods; here, however, mud and debris plugged the fishes mouths and gills while being caught in a haul seine and probably caused dislodgment. Even though the isopods left the fish in these instances, parasite damage to the gill filaments was obvious and was used to determine which fish had harbored parasites. This seemed reasonable as only two fish, both containing gravid isopods, showed no filament damage, suggesting that gill filaments began regenerating once the isopods assumed the commensal relationship.

The amount of gill damage caused by the presence of isopods in the transitional stage varied among the fish (Table 1). It is not known whether isopods ingest host tissue or if damage is caused by abrasion. The severe damage would suggest that the host tissue is being eaten. Gill damage was subjectively determined as minor, a small section of filaments destroyed; major, large section of filaments destroyed; or massive, a gill arch broken (Fig. 3). Damage to the filaments usually occurred on the first gill arch on the side where the isopod was attached, but in many fish, the parasite destroyed filaments and rakers on several gill arches or on both sides of the mouth. Since none of the

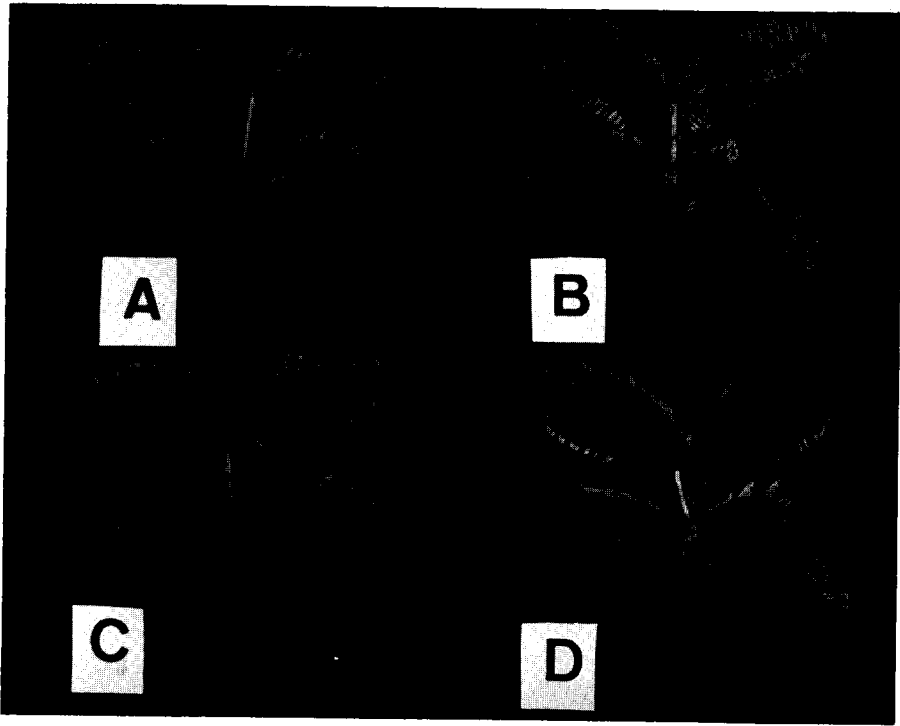


Fig. 3. Gill damage caused by *O. praegustator* in the transitional stage of development. A, B, and C illustrate minor, major and massive gill filament damage. D illustrates the first two gill arches from an uninfested juvenile menhaden.

fish examined harbored more than one isopod, we assumed all damage resulted from a single parasite. The inside of the opercles of some fish was also damaged, evidently by rubbing of the isopods while they were on the gills.

The presence of the isopod and the resulting damage may change the fish's behavior, affect its feeding and growth, or even cause mortality. Parasitized adult menhaden occurred much more frequently in schools of injured fish we caught in the estuaries than in schools caught commercially by purse seiners, suggesting, as reported by Gunter and Ward (1961) for injured and sick fish, that parasitized menhaden may come into estuaries to recuperate. Westman and Nigrelli (1955) mentioned that gill parasites may cause menhaden mortality when the fish's resistance has been lowered by abnormal environmental conditions. Alperin (1966) cited two reports from Asia indicating that the isopod, *Ichtyoxenon* (*Livonica*) *amurensis*, is harmful to fish, slows their growth, and causes some mortality. The ex-

tensive damage to the gill filaments in juvenile menhaden suggests that *O. praegustator* could impair growth or cause mortality. Present observations and knowledge, however, do not permit an accurate assessment of the impact of the isopod on menhaden growth or survival.

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